

0050/50716

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We claim:

1. A DNA sequence comprising the coding region of a plant dihydroorotase, wherein the nucleotide sequence of this DNA sequence is SEQ-ID NO:1.
2. A DNA sequence hybridizing with DNA sequence SEQ-ID NO: 1 as claimed in claim 1 or a part thereof or a derivative derived from such a sequence by insertion, deletion or substitution, and encoding a protein which has the biological activity of a dihydroorotase, this DNA sequence having a homology of at least 80% with respect to SEQ ID NO: 1.
- 15 3. A protein with dihydroorotase activity comprising an amino acid sequence which constitutes a SEQ-ID NO: 2 subsequence of at least 100 amino acids.
4. A protein as claimed in claim 3, which comprises, as amino acid sequence, the subsequence 50 - 300 from SEQ-ID NO: 2.
5. A protein as claimed in claim 4, which comprises, as amino acid sequence, the sequence shown in SEQ-ID NO: 2.
- 25 6. The use of a DNA sequence as claimed in claim 1 or of a DNA sequence which has a homology of at least 40% with respect to SEQ ID NO: 1 and which encodes a protein which has the biological activity of a dihydroorotase for being introduced into pro- or eukaryotic cells, this sequence optionally being linked to regulatory elements which ensure transcription and translation in the cells, and this sequence leading to the expression of a translatable mRNA which causes the synthesis of a dihydroorotase.
- 35 7. The use of a DNA sequence as claimed in claim 1 or of a DNA sequence which has a homology of at least 40% with respect to SEQ ID NO: 1 and which encodes a protein which has the biological activity of a dihydroorotase for the generation of an assay system for identifying herbicidally active dihydroorotase inhibitors.
- 40 8. The use of the DNA sequence SEQ-ID No. 1 encoding a dihydroorotase and of the DNA sequence SEQ ID No. 3 encoding a dihydroorotate dehydrogenase for generating an assay system for identifying herbicidally active dihydroorotase inhibitors.

9. A method for finding herbicidally active substances which inhibit the activity of plant dihydroorotase, which comprises generating, in a first step, dihydroorotase using a DNA sequence as claimed in claim 1 or a DNA sequence having a homology of at least 40% with respect to SEQ ID NO: 1 and which encodes a protein which has the biological activity of a dihydroorotase, and, in a second step, measuring the activity of the plant dihydroorotase in the presence of a test substance.

10. 10. A method as claimed in claim 9, wherein the plant dihydroorotase is measured in a high-throughput screening (HTS).

15 11. A method of identifying herbicidally active substances which inhibit the dihydroorotase activity in plants, consisting of the following steps

20 a) the generation of transgenic plants, plant tissues or plant cells which comprise an additional DNA sequence encoding an enzyme with dihydroorotase activity and which are capable of overexpressing an enzymatically active dihydroorotase;

25 b) applying a substance to transgenic plants, plant cells, plant tissues or plant parts and to untransformed plants, plant cells, plant tissues or plant parts;

30 c) determining the growth or the viability of the transgenic and the untransformed plants, plant cells, plant tissues or plant parts after application of the chemical substance; and

35 d) comparing the growth or the viability of the transgenic and the untransformed plants, plant cells, plant tissues or plant parts after application of the chemical substance;

40 where suppression of the growth or the viability of the untransformed plants, plant cells, plant tissues or plant parts without greatly suppressing the growth or the viability of the transgenic plants, plant cells, plant tissues or plant parts confirms that the substance of b) shows herbicidal activity and inhibits the enzyme activity in plants.

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12. An assay system based on the expression of a DNA sequence SEQ-ID No. 1 as claimed in claim 1 or of a DNA sequence having a homology of at least 40% with SEQ ID NO: 1 and which encodes a protein which has the biological activity of a dihydroorotase, for identifying herbicidally active dihydroorotase inhibitors.
13. An assay system based on the expression of a DNA sequence SEQ-ID No. 1 and of a DNA sequence SEQ-ID No: 3 for identifying herbicidally active dihydroorotase inhibitors.
14. An assay system as claimed in claim 12 or 13 for identifying inhibitors of plant dihydroorotase, which comprises incubating the enzyme with a test substrate to be studied and, after a suitable reaction time, determining the enzymatic activity of the enzyme in comparison with the activity of the uninhibited enzyme.
15. A plant dihydroorotase inhibitor.
16. A plant dihydroorotase inhibitor, identified using an assay system as claimed in any of claims 12, 13 or 14.
17. An inhibitor identified as claimed in claim 15 or 16 for use as herbicide.
18. A method of eliminating undesired vegetation, which comprises treating the plant to be eliminated with a compound which specifically binds to, and inhibits the function of, a dihydroorotase encoded by a DNA sequence as claimed in claim 1 or or [sic] a DNA sequence which has a homology of at least 40% with respect to SEQ ID NO:1 and which encodes a protein which has the biological activity of a dihydroorotase.

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